DOCKET NO. US 000050 (PHIL06-00033) PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	:	ROBERT A. COHEN, ET AL.
Serial No.	:	09/516,035
Filed	:	March 1, 2000
For	:	METHOD AND APPARATUS FOR STREAMING SCALABLE VIDEO
Group No.	:	2613
Examiner	:	G.S. Phillipe

BOX AF
Commissioner for Patents
Washington, D. C. 20231

Sir:

APPELLANT'S BRIEF ON APPEAL

This Brief is submitted in triplicate on behalf of Appellant for the application identified above. A check is enclosed for the $320.00 fee for filing a Brief on Appeal. Please charge any additional necessary fees to Deposit Account No. 50-0208.

REAL PARTY IN INTEREST

The real party in interest for this appeal is the assignee of the application, U.S. PHILIPS CORPORATION.

RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences related to the present application which are currently pending.

STATUS OF CLAIMS

Claims 1–16 are pending in the present application. Claims 1–4, 6–8 and 11–16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S Patent No. 6,275,531 to *Li*. Claims 9–10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li* in view of U.S Patent No. 5,742,892 to *Chaddha et al.* Claim 5 objected to as being dependent upon a rejected base claim, but was indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The rejection of pending claims 1–4 and 6–16 is appealed.

STATUS OF AMENDMENTS

No amendments to the claims were submitted following the final Office Action dated July 3, 2002.

SUMMARY OF THE INVENTION

The present invention relates to streaming scalable video. Scalable video allows different levels or amounts or levels of data per frame of video to be encoded. In particular, for Motion Picture Expert Group (MPEG) coding standards, a base layer contains the minimum amount of data required to decode a video stream, while enhancement layer(s) contain additional data for improving the quality of the decoded video image. Specification, page 1, lines 14–17. In particular, with fine-granular scalability (FGS), in which the video images are encoded at progressively hire resolutions, enhancement layers are provided for a number of transmission rates. Specification, page 1, lines 23–31.

In the present invention, a coded video stream including both base and enhancement layers is logically divided into a number of time intervals, each of which equal in duration some multiple of the system clock period T, and is transmitted at a frame rate of v frames/second. Specification, page 4, lines 11–22. The bandwidth available during each interval is monitored and the number of bits s_i which are unavailable for data transmission (i.e., used for other purposes and/or lost due to noise) is determined:

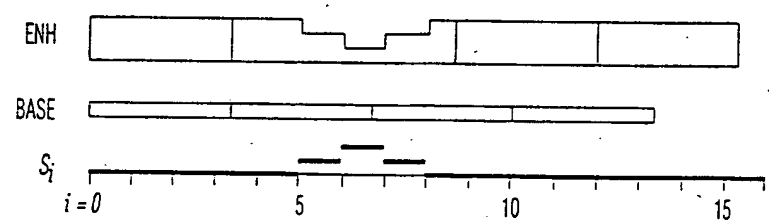

FIG. 1

Specification, Figure 1, page 4, line 23 through page 5, line 3. In the example of Figure 1, time intervals 5, 6 and 7 have less bandwidth available, such that transmission of enhancement layers (ENH) for the current frame requires longer than transmission of the corresponding base layer, causing the enhancement layer frames to be out of sync with the base layer frames. Specification, page 5, lines 4–13. To avoid this, the present invention reduces the number of enhancement layers transmitted for the frame(s) being transmitted when the intervals having reduced available bandwidth occur, keeping the base layer frames and the enhancement layer frames in synchronization (or at least limiting the degree of non-synchronization):

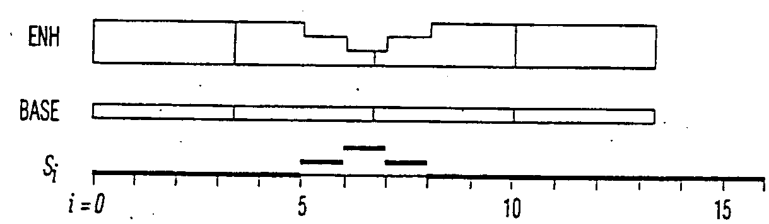

FIG. 2

Specification, Figure 2, page 5, lines 14–31. The number of bits of enhancement layer data dropped is spread equally over a predetermined number of frames to prevent rapid variations in image quality.

ISSUES ON APPEAL

Claims 1–4, 6–8 and 11–16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. Claims 9–10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li* in view of *Chaddha et al.* The issues on appeal are:

1) whether 1–4, 6–8 and 11–16 were properly rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*; and

2). whether 9–10 were properly rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li* in view of *Chaddha et al.*

GROUPING OF CLAIMS

Claims 1–4, 6–8 and 11–16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. Claims 9–10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li* in view of *Chaddha et al.* For purposes of this appeal, the pending claims will be grouped together as follows:

Group A – claims 1–4 and 6–16 (all pending rejected claims); and

Group B – claims 3 and 8;

Group C – claim 4;

Group D – claim 12;

Group E – claim 13;

Group F – claim 14;

Group G – claim 15; and

Group H – claim 16.

Groups A–H stand or fall independently. Patentability of the claims within each group is argued separately below.

ARGUMENT

As an initial matter, Applicant notes that the final Office Action contains the following paragraph:

> Note: the applicant should really consider the previously cited prior art Radha et al. (U.S. 6,292,215) [sic] as rejecting all the claims except claim 5. In Radha et al. it is disclosed that the system determines a bandwidth of the receiver and then selects which of the coded residual images to output based on the bandwidth of the receiver (See Radha et al. col. 2, lines 49–64), the argued granulity [sic] adaptation" is taught in col. 3, line 41–52. Radha et al. also determines whether a loss occured [sic] during a given interval (See Radha et al. col. 9, lines 58–66 and in col. 10, lines 5–11). The parameters monitoring step performed periodically in Radha et al. determines whether a loss occured [sic] in the given interval.

Paper No. 6, page 5. U.S. Patent No. 6,292,512 to *Radha et al* was made of record in a Notice of References Cited (Form PTO-892) attached to the first Office Action mailed January 3, 2002 (Paper No. 4). However, contrary to the assertion in the above-quoted paragraph, *Radha et al* was never previously cited as the basis for any rejection. In addition, the above-quoted

paragraph does not clearly indicate whether the "unofficial" rejection over *Radha et al* is for anticipation under 35 U.S.C. § 102 or obviousness under 35 U.S.C. § 103(a). Applicant is therefore apparently expected to consider the claims "informally" or "unofficially" rejected on an uncertain basis over a newly-cited reference. Applicant respectfully submits that such actions are inherently arbitrary and capricious.

Moreover, it is unclear why *Radha et al* was not previously cited in the first Office Action. The MPEP requires that rejections be based on the best art available. MPEP § 706.02. Alternative rejections are permissible. The Examiner's prior knowledge of the *Radha et al* reference creates at least the appearance of "sandbagging," holding a better reference in reserve with the intent of subsequently dismissing an Applicant's argument as "moot in view of the new grounds of rejection," where such new grounds of rejection are "necessitated by Applicant's amendment." In this case, however, the claims were not amended in response to the first Office Action, except to correct minor typographical errors.

Finally, *Radha et al* and the subject application share a common inventor are were both assigned or subject to a duty of assignment to a common assignee at the time the invention was made. As such, *Radha et al* is not available as a prior art reference for obviousness determinations.

Group A

Claims 1–4, 6–8 and 11–16 of Group A were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. Claims 9–10 of Group A were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li* in view of *Chaddha et al.* These claims are properly grouped together and considered separately from the claims of Groups B–H since they are subject to common grounds of rejection and contain common limitations distinguishing the claims over the cited references, and since a decision with respect to the claims of Group A may obviate the need for consideration of Groups B–H.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142; *In re Fritch*, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984). Only when a *prima facie* case of obviousness is established does the burden shift to the applicant to produce evidence of nonobviousness. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of a patent. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d

1443, 1444 (Fed. Cir. 1992); *In re Grabiak*, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. MPEP § 2142.

Each of independent claims 1, 7 and 9–11 of Group A recites performing various actions involved in streaming video data (i.e., "transmitting the base layer data for a given interval"; "determining if a loss of bandwidth has occurred in the given interval"; and "transmitting the reduced amount of enhancement layer data in the given interval") with respect to "a given interval," and thus requires that the streaming video data be logically divided into time intervals, which the specification teaches are integer number of clock periods T. With regard such intervals, the first Office Action states:

> The applicant should also note that the claims "*given interval*" is analogous to Li's interval disclosed in col. 1, lines 46–47.

Paper No. 4, page 3 (emphasis in original). However, this cited portion of *Li* actually relates to encoding video data, not to streaming the encoded video data:

> The basic idea behind MPEG video compression is to remove spatial redundancy within a video frame and temporal redundancy between video frames. The DCT-based (Discrete Cosine Transform) compression is used to reduce spatial redundancy and motion compensation is used to exploit temporal redundancy. The images in a video stream usually do not change much within small time intervals. Thus, the idea of motion-compensation is to encode a video frame based on other video frames temporally close to it.

Li, column 1, lines 41–49. The final Office Action cites an additional portion of *Li*:

> While the examiner understands the applicants argument, the examiner wishes to point to Li col. 5, lines 47-56 which is a more detailed definition of the previously cited section of Li (col. 1, line 46-47). The applicant should also note that Li clearly indicates that the scalable video coding technique is very desirable for transmitting video over a time varying bandwidth. Therefore, the step of providing " a given interval" in Li is rather inherent (See Li col. 2, lines 28-37 and col. 8, lines 64-67).

Paper No. 6, page 3. However, that portion of *Li* relates to adapting the number of bitstreams that are transmitted at the beginning of transmission, NOT dynamically during each of a number of intervals during transmission:

> The basic idea behind MPEG video compression is to remove spatial redundancy within a video frame and temporal redundancy between video frames. The DCT-based (Discrete Cosine Transform) compression is used to reduce spatial redundancy and motion compensation is used to exploit temporal redundancy. The images in a video stream usually do not change much within small time intervals. Thus, the idea of motion-compensation is to encode a video frame based on other video frames temporally close to it.

. . . .

The bitstream from the base layer encoder 30 and the N bitstreams from the enhancement layer encoder 40 are capable of being sent to the transmission channel 60 by at least two methods. In the first method all bitstreams are multiplexed together by multiplexor 50 with different priority identifiers, e.g., the base layer bitstream is guaranteed, enhancement bitstream layer 1 provided by enhancement layer encoder 40 is given a higher priority than enhancement bitstream layer 2. The prioritization is continued until all N (wherein N is an integer from 0, 1, 2, . . .) of the bitstreams layers are prioritized. Logic in the encoding layers 30 or 40 in negotiation with the network and intermediated devices determine the number N of bitstream layers to be generated.

The number of bitstream layers generated is a function of the total possible bandwidth of the transmission channel 60, i.e. Ethernet, LAN, or WAN connections (this list is not intended to exhaustive but only representation of potential limiting devices and/or equipment), and the network and other intermediate devices. The number of bitstream layers M (wherein M is an integer and M≤N) reaching the destination point 100 can be further limited by not just the physical constraints of the intermediate devices but the congestion on the network, thereby necessitating the dropping of bitstream layers according to their priority.

In a second method the server 50 knows the transmission channel 60 condition, i.e. congestion and other physical constraints, and selectively sends the bitstreams to the channel according to the priority identifiers. In either case, the destination point 100 receives the bitstream for the base layer and M bitstreams for the enhancement layer, where M≤N.

The bitstreams M are sent to the base layer 90 and enhancement layer 80 decoders after being demultiplexed by demultiplexor 70. The decoded enhancement information from the enhancement layer decoder is passed to the base layer decoder to composite the reconstructed video output 100. The decoding of the multiplexed bitstreams are accomplished pursuant to the methods and algorithms depicted in flow diagrams 1100-1400 of FIGS. 11-14, respectively.

Li, column 1, lines 41–49; column 5, line 43 through column 6, line 15. The cited portion of *Li* thus relates to sending, for an <u>entire</u> transmission, a number of enhancement layers based on physical constraints of intermediate devices, where some enhancement layers are dropped by

the receiver due to congestion on intermediate devices, or alternatively sending, for the entire transmission, a number of enhancement layers based on congestion as well as physical constraints. *Li* does not teach or suggest adjusting the number of enhancement layers transmitted during transmission, and the logical division of the transmission period into intervals is therefore not necessary or inherent to the mechanism disclosed by *Li*.

The Advisory action asserts:

> In order for Li to adapt the video data stream to constraints such as available bandwidth for a particular client, bandwidth availability must be determined since the capability of the transmission channel must be determined (Li, col. 3, lines 44–66).

Paper No. 9, items 7 and 10. The additional portion of *Li* cited in the Advisory Action reads:

> The present invention can be characterized as a scalable video coding means and a system for encoding video data, such that quality of the final image is gradually improved as more bits are received. The improved quality and scalability are achieved by a method wherein an enhancement layer is subdivided into layers or levels of bitstream layers. Each bitstream layer is capable of carrying information complementary to the base layer information, in that as each of the enhancement layer bitstreams are added to the corresponding base layer bitstreams the quality of the resulting images are improved.
>
> The number N of enhancement layers is determined or limited by the network that provides the transmission channel to the destination point. While the base layer bitstream is always transmitted to the destination point, the same is not necessarily true for the enhancement layers. Each layer is given a priority coding and transmission is effectuated according to the priority coding. In the event that all of the enhancement layers cannot be transmitted the lower priority coded layers will be omitted. The omission of one or more enhancement layers may be due to a multitude of reasons.
>
> For instance, the server which provides the transmission channel to the destination point may be experiencing large demand on its resources from other users, in order to try and accommodate all of its users the server will prioritize

the data and only transmit the higher priority coded packets of information. The transmission channel may be the limiting factor because of the bandwidth of the channel, i.e. Internet access port, Ethernet protocol, LAN, WAN, twisted pair cable, co-axial cable, etc. or the destination device itself, i.e. modem, absence of an enhanced video card, etc. may not be able to receive the additional bandwidth made available to it. In these instances only M number (M is an integer number=0, 1, 2, . . .) of enhancement layers may be received, wherein N number (N is an integer number=0, 1, 2, . . .) of enhancement layers were generated at the encoding stage, $M \leq N$.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the scalable video method and apparatus according to one aspect of the invention includes a video encoding method for adapting a video input to a bandwidth of a transmission channel of a network, the method includes determining the number N of enhancement layer bitstreams capable of being adapted to the bandwidth of the transmission channel of the network. Encoding a base layer bitstream from the video input is then performed and encoding N number of enhancement layer bitstreams from the video input based on the base layer bitstream, wherein the plurality of enhancement layer bitstreams complements the base layer bitstream. The base layer bitstream and the N enhancement layer bitstreams are then provided to the network.

According to another aspect of the present invention, a video decoding method for adapting a video input to a bandwidth of a transmission channel of a network includes, determining number M of enhancement layer bitstreams of said video input capable of being received from said transmission channel of said network. Decoding a base layer bitstream from received video input and decoding M number of enhancement layer bitstreams from the received video input based on the base layer bitstream, wherein the M received enhancement layer bitstreams complements the base layer bitstream. Then reconstructing the base layer bitstream and N enhancement layer bitstreams.

According to still another aspect of the present invention, a video decoding method for adapting a video input to a bandwidth of a receiving apparatus, the method includes demultiplexing a base layer bitstream and at least one of a plurality of enhancement layer bitstreams received from a network, decoding the base layer bitstream, decoding at least one of the plurality of enhancement layer bitstreams based on generated base layer bitstream, wherein the at least one of the plurality of enhancement layer bitstreams enhances the base layer bitstream. Then reconstructing a video output.

Li, column 3, line 6 through column 4, line 13. *Li* thus teaches adapting the number of enhancement layers that are transmitted to the available bandwidth. However, as noted above, *Li* predetermines the available bandwidth for an entire streaming period by determining the bandwidth just prior to initiating streaming. *Li*, column 1, lines 41–49; column 5, line 43 through column 6, line 15. *Li* does NOT teach or suggest dynamically determining available bandwidth for each of a number of intervals during streaming, and adapting the number of enhancement layers transmitted during the respective intervals based on such determinations, as recited in the claims.

Specifically, independent claims 1 and 9–11 each recite determining if a loss of bandwidth has occurred during a given streaming interval. Such a feature is not shown or suggested by the cited reference. *Li* does not teach or suggest determining if a loss of bandwidth has occurred during a particular streaming interval, only determining available bandwidth prior to encoding the video data and initiating streaming. The final Office Action argues that identification of various conditions indicating a loss of bandwidth is sufficient to anticipate the limitation. However, recognition that bandwidth may be time varying does NOT constitute determining whether a loss of bandwidth occurs during a given interval or period. Moreover, *Li* does not enable making such a determination.

Independent claim 7 recites selecting a predetermined number of frames if a loss of bandwidth has occurred in a given streaming interval, intrinsically requiring determination of

whether a loss of bandwidth has occurred during that streaming interval. As noted above, such a feature is not shown or suggested by the cited reference, which teaches only determining available bandwidth prior to encoding the video data and initiating streaming, not determining if a loss of bandwidth has occurred during a particular streaming interval.

Each of independent claims 1, 7 and 9–11 also recite adapting the transmission to any loss of bandwidth during the given interval by calculating a reduced amount of enhancement data which may be transmitted given the constraint of the bandwidth loss, and transmitting such a reduced amount of enhancement layer data. Such a feature is not shown or suggested by the cited reference. As noted above, *Li* teaches adapting an entire video data stream to constraints such as available bandwidth for a particular client (or the priority of concurrently transmitted video data streams), but does not teach of suggest dynamically adapting the granularity of the video data stream during streaming to accommodate a loss of bandwidth during at a particular time period or interval. *Li* only teaches that the number M of bitstreams generated is selected based on knowledge of channel conditions, but does not teach or suggest (or enable) dynamic modification of the number of bitstreams generated due to changing conditions during transmission, rather than initial selection of the number of bitstreams for an entire transmission cycle.

Group B

Claims 3 and 8 of Group B were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. These claims are properly grouped together and considered separately from the claims of Groups A and C–H since they contain common limitations distinguishing the claims over the cited references which are not found in the claims of Groups A and C–H: distributing the reduction in enhancement layer data evenly over a predetermined number of frames.

Claims 3 and 8 recite distributing the reduction in enhancement layer data evenly over a predetermined number of frames. Such a feature is not shown or suggested by *Li*. *Li* does not teach or suggest allocating anything over a predetermined number of frames within a given streaming interval.

The final Office Action notes that *Li* teaches adapting transmissions of multiple video streams based on individual priorities associated with each stream. However, *Li* does not teach or suggest allocating any constraints on lower priority streams evenly across all such lower priority streams, or across a predetermined number of frames. Thus, even if adaptation based on priority were analogous to adaptation based on lost bandwidth, *Li* does not teach or suggest the recited limitation.

Group C

Claim 4 of Group C was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. This claim is properly considered separately from the claims of Groups A–B and D–H since

it contains a limitation distinguishing the claim over the cited references which is not found in the claims of Groups A–B and D–H: determining if space remains within a given (current) interval and, if so, transmitting at least a portion of the reduced enhancement layer data allocated to be transmitted during a second (subsequent) interval within the current interval.

The claims of Group C recite using any remaining space in a given interval to transmit enhancement layer data for a subsequent interval, to restore transmission of all enhancement layers as soon as possible. Such a feature is not shown or suggested by the cited reference.

Group D

Claim 12 of Group D was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. This claim is properly considered separately from the claims of Groups A–C and E–H since it contains a limitation distinguishing the claim over the cited references which is not found in the claims of Groups A–C and E–H: that the predetermined number of frames over which the loss of bandwidth is distributed comprises frames for the current intervals.

Such a feature is not shown or suggested by the cited reference. This claim was added in response to the first Office Action, and was not specifically addressed in the final Office Action.

Group E

Claim 13 of Group E was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. This claim is properly considered separately from the claims of Groups A–D and F–H since

it contains a limitation distinguishing the claim over the cited references which is not found in the claims of Groups A–D and F–H: calculating an amount of enhancement layer data accommodating the loss of bandwidth during the given interval.

Such a feature is not shown or suggested by the cited reference. This claim was added in response to the first Office Action, and was not specifically addressed in the final Office Action.

Group F

Claim 14 of Group F was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. This claim is properly considered separately from the claims of Groups A–E and G–H since it contains a limitation distinguishing the claim over the cited references which is not found in the claims of Groups A–E and G–H: determining a number of bits during the given interval consumed by transmission of non-enhancement layer data.

Such a feature is not shown or suggested by the cited reference. This claim was added in response to the first Office Action, and was not specifically addressed in the final Office Action.

Group G

Claim 15 of Group G was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. This claim is properly considered separately from the claims of Groups A–F and H since it contains a limitation distinguishing the claim over the cited references which is not found in

the claims of Groups A–F and H: determining a number of bits during the given interval lost due to packet loss, noise, or bandwidth variation.

Such a feature is not shown or suggested by the cited reference. This claim was added in response to the first Office Action, and was not specifically addressed in the final Office Action.

Group H

Claim 16 of Group H was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Li*. This claim is properly considered separately from the claims of Groups A–G since it contains a limitation distinguishing the claim over the cited references which is not found in the claims of Groups A–G: calculating a number of lost bandwidth bits to be allocated to each of the predetermined number of frames.

Such a feature is not shown or suggested by the cited reference. This claim was added in response to the first Office Action, and was not specifically addressed in the final Office Action.

CONCLUSION

None of the cited references, taken alone or in combination, show or suggest all features of the invention claimed in Groups A–H. Therefore, the rejections under 35 U.S.C. § 103 are improper. Applicant respectfully requests that the Board of Appeals reverse the decision of the Examiner below rejecting all pending claims in this application.

Respectfully submitted,

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Date: Dec. 9, 2002

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APPENDIX TO APPELLANT'S APPEAL BRIEF

1. (unchanged) A method for streaming scalable video including base layer data and enhancement layer data, comprising the steps of:

transmitting the base layer data for a given interval;

determining if a loss of bandwidth has occurred in the given interval;

selecting a predetermined number of frames to distribute the loss of bandwidth over;

calculating a reduced amount of enhancement layer data to transmit in the predetermined number of frames; and

transmitting the reduced amount of enhancement layer data in the given interval.

2. (unchanged) The method according to claim 1, further comprising:

transmitting non-enhancement layer data during the given interval.

3. (unchanged) The method according to claim 1, wherein the calculating step is performed so that the loss of bandwidth is distributed evenly over the predetermined number of frames.

4. (unchanged) The method according to claim 1, further comprising the steps of:

determining if there is still space in the given interval; and

transmitting at least a portion of the reduced amount of enhancement layer data from a second given interval in the given interval.

5. (unchanged) The method according to claim 1, further comprising the steps of:

determining if the pre-determined number of frames has expired;

determining if any left-over enhancement layer data exists;

selecting a second predetermined number of frames to distribute the left-over enhancement data over;

calculating a second reduced amount of enhancement layer data to transmit in the second predetermined number of frames; and

transmitting the second reduced amount of enhancement layer data in a second given interval.

6. (unchanged) The method according to claim 1, wherein the enhancement layer data has a fine grain scalability structure.

7. (unchanged) A method for streaming scalable video including base layer data and enhancement layer data, comprising the steps of:

transmitting the base layer data for a given interval;

selecting a predetermined number of frames if a loss of bandwidth has occurred in the given interval;

distributing the loss of bandwidth over the predetermined number of frames to produce a reduced amount of enhancement layer data; and

transmitting the reduced amount of enhancement layer data in the given interval.

8. (unchanged) The method according to claim 7, wherein the distributing step is performed so that the loss of bandwidth is distributed evenly over the predetermined number of frames.

9. (unchanged) A memory medium including code for streaming scalable video including base layer data and enhancement layer data, the code comprising:

a first transmitting code to transmit the base layer data for a given interval;

a determining code to determine if a loss of bandwidth has occurred in the given interval;

a selecting code to select a predetermined number of frames to distribute the loss of bandwidth over;

a calculating code to calculate a reduced amount of enhancement layer data to transmit in the predetermined number of frames; and

a second transmitting code to transmit the reduced amount of enhancement layer data in the given interval.

10. (unchanged) An apparatus for streaming scalable video including base layer data and enhancement layer data, comprising:

a memory which stores executable code; and

a processor which executes code stored in the memory so as to (i) transmit the base layer data for a given interval, (ii) determine if a loss of bandwidth has occurred in the given interval, (iii) select a predetermined number of frames to distribute the loss of bandwidth over, (iv) calculate a reduced amount of enhancement layer data to transmit in the predetermined number of frames, and (v) transmit the reduced amount of enhancement layer data in the given interval.

11. (unchanged) An apparatus for streaming scalable video including base layer data and enhancement layer data, comprising:

means for transmitting the base layer data for a given interval;

means for determining if a loss of bandwidth has occurred in the given interval;

means for selecting a predetermined number of frames to distribute the loss of bandwidth over;

means for calculating a reduced amount of enhancement layer data to transmit in the predetermined number of frames; and

means for transmitting the reduced amount of enhancement layer data in the given interval.

12. (unchanged) The method according to claim 1, wherein the predetermined number of frames over which the loss of bandwidth is distributed comprises frames within the given interval.

13. (unchanged) The method according to claim 1, wherein the step of calculating a reduced amount of enhancement layer data to transmit in the predetermined number of frames further comprises:

calculating an amount of enhancement layer data accommodating the loss of bandwidth during the given interval.

14. (unchanged) The method according to claim 1, wherein the step of determining if a loss of bandwidth has occurred in the given interval further comprises:

determining a number of bits during the given interval consumed by transmission of non-enhancement layer data.

15. (unchanged) The method according to claim 1, wherein the step of determining if a loss of bandwidth has occurred in the given interval further comprises:

determining a number of bits during the given interval lost due to packet loss, noise, or bandwidth variation.

16. (unchanged) The method according to claim 1, wherein the step of calculating a reduced amount of enhancement layer data to transmit in the predetermined number of frames further comprises:

calculating a number of lost bandwidth bits to be allocated to each of the predetermined number of frames.

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PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	:	Robert A. Cohen, et al.
Serial No.	:	09/516,035
Filed	:	March 1, 2000
For	:	METHOD AND APPARATUS FOR STREAMING SCALABLE VIDEO
Group No.	:	2613
Examiner	:	G.S. Phillipe

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Sir:

The undersigned hereby certifies that the following documents:

1. Appeal Brief (in triplicate);
2. Check in the amount of $320.00 for the Appeal Brief filing fee; and
3. Two (2) postcard receipts;

relating to the above application, were deposited as "First Class Mail" with the United States Postal Service, addressed to Box AF, Commissioner for Patents, Washington, D.C. 20231, on December 9, 2002.

Date: 12/9/02

Kathy Longenecker
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Date: Dec. 9, 2002

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